What is Claimed is:

1. A fuel control system for use with a gas turbine engine comprising:

a) means for measuring a plurality of engine operating parameters;

b) means for determining an initial engine fuel demand based on the plurality of measured engine operating parameters;

c) means for estimating, during engine operation and based on the plurality of measured operating parameters, an amount of heat transferred between fuel combustion gases and engine metal;

d) means for estimating an effective fuel flow adjustment based on the estimated amount of heat transfer between the combustion gases and the engine metal; and

e) means for determining a final engine fuel demand based on the initial engine fuel demand and the estimated effective fuel flow adjustment.

2. A control system as recited in Claim 1, wherein the means for measuring a plurality of engine operating parameters includes means for providing a gas generator speed signal indicative of an actual rotary speed of an engine gas generator.

3. A control system as recited in Claim 1, wherein the means for measuring a plurality of engine operating parameters includes means for providing a compressor discharge pressure signal indicative of an actual engine compressor discharge pressure.

4. A control system as recited in Claim 2, wherein the means for determining the initial engine fuel demand includes a fuel flow controller which iteratively compares an actual rate of change of gas generator speed which is determined from the gas generator speed signal to a maximum and minimum desired rate of change of gas generator speed.

5. A control system as recited in Claim 4, wherein the maximum and minimum desired rate of change of gas generator speed is determined based on an acceleration/deceleration schedule.

6. A control system as recited in Claim 1, wherein the means for estimating the amount of heat transferred between the fuel combustion gases and the engine metal includes an engine combustion model which comprises:

a) means for estimating an amount of heat generated by engine fuel combustion;

b) means for estimating an amount of heat generated by engine supply air compression; and

c) means for estimating gas generator exit gas temperature.

7. A control system as recited in Claim 1, wherein the means for estimating the effective fuel flow adjustment includes a fuel flow adjuster model which determines the effective fuel flow adjustment from the estimated amount of heat transferred between the fuel combustion gases and the engine metal, a gas generator efficiency and a heating coefficient of fuel.

8. A control system as recited in Claim 1, further comprising a fuel metering system which provides fuel to the engine based on the final engine fuel demand.

9. A control system as recited in Claim 8, wherein the fuel metering device includes a variable displacement vane pump.

10. A control system as recited in Claim 7, wherein the means for estimating the effective fuel flow adjustment further comprises an amplifier means for providing a amplified effective fuel flow adjustment.

11. A control system as recited in Claim 1, further comprising means for providing a signal indicative of the effective fuel flow estimate to the means for determining the final fuel demand.

12. A fuel control method for gas turbines having a compressor and a gas generator, comprising:

a) measuring a plurality of engine operating parameters;

b) determining an initial engine fuel demand based on the plurality of measured engine operating parameters;

c) estimating during engine operation and based on the plurality of measured operating parameters, an amount of heat transferred between fuel combustion gases and engine metal;

d) estimating an effective fuel flow adjustment based on the estimated heat transfer between the combustion gases and the engine metal; and

e) determining a final engine fuel demand based on the initial engine fuel demand and the estimated effective fuel flow adjustment.

13. A fuel control method as recited in Claim 12, wherein the step of measuring a plurality of engine operating parameters includes the steps of measuring the gas generator speed and providing a gas generator speed signal indicative of the actual rotary speed of the gas generator.

14. A fuel control method as recited in Claim 12, wherein the step of measuring a plurality of engine operating parameters includes the steps of measuring engine compressor discharge pressure and providing a compressor discharge pressure signal indicative of the actual engine compressor discharge pressure.

15. A fuel control method as recited in Claim 13, wherein the step of determining the initial engine fuel demand includes the use of fuel flow controller which iteratively compares an actual rate of change of gas generator speed which is determined from the gas generator speed signal to a maximum and minimum desired rate of change of gas generator speed.

16. A fuel control method as recited in Claim 15, wherein the maximum and minimum desired rate of change of gas generator speed is determined based on an acceleration/deceleration schedule and is a function of the gas generator speed signal.

17. A fuel control method as recited in Claim 12, wherein the step of estimating the amount of heat transferred between the fuel combustion gases and the engine metal comprises:

a) estimating an amount of heat generated by engine fuel combustion;

b) estimating an amount of heat generated by engine supply air compression; and

c) estimating gas generator exit gas temperature.

18. A fuel control method as recited in Claim 12, wherein the step of estimating the effective fuel flow adjustment includes determining the effective fuel flow adjustment from the estimated heat transfer, a gas generator efficiency and a heating coefficient of fuel.

19. A fuel control method as recited in Claim 12, further comprising providing, by means of a fuel metering system, fuel to the engine based on the signal of final engine fuel demand.

20. A fuel control method as recited in Claim 19, wherein the fuel metering device includes a variable displacement vane pump.

21. A fuel control method as recited in Claim 18, wherein the step of estimating the effective fuel flow adjustment further comprises amplifying by amplifier means the effective fuel flow adjustment.

22. A fuel control system for use with a gas turbine engine comprising:

a) means for measuring a plurality of engine operating parameters;

b) means for determining an initial engine fuel demand based on the plurality of measured engine operating parameters;

c) means for measuring during engine operation an amount of heat transferred between fuel combustion gases and engine metal;

d) means for estimating an effective fuel flow adjustment based on the measured heat transfer between the combustion gases and the engine metal; and

e) means for determining a final engine fuel demand based on the initial engine fuel demand and the estimated effective fuel flow adjustment.

23. A fuel control method for gas turbines comprising:

a) measuring a plurality of engine operating parameters;

b) determining an initial engine fuel demand based on the plurality of measured engine operating parameters;

c) measuring an amount of heat transferred between fuel combustion gases and engine metal;

d) estimating an effective fuel flow adjustment based on the measured heat transfer between the combustion gases and the engine metal; and

e) determining a final engine fuel demand based on the initial engine fuel demand and the estimated effective fuel flow adjustment.